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ABSTRACT

Two methods of dynamic assessment, graduated prompt and mediation, were compared to each other and to static assessment of 60 mildly mentally retarded or academically at risk preschoolers. Measures included Ss' classification as learner or nonlearner, achievement on independent performance, achievement on pretest and transfer posttest, observed off-task behavior, and amount of time in training. Dynamic models were chosen because of advantages in identifying children with intellectual deficits and ascertaining educationally relevant diagnostic information. Ss receiving dynamic assessment showed learning potential not exhibited on static assessment. Ss receiving mediation dynamic assessment performed a transfer task better than the graduated prompt and static assessment groups. Amount of training time did not account for results. (Author/CL)

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Vanderbilt University

Learning Potential Assessment for Preschool Children

Final Report

Grant #G008201038

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Introduction

In 1981, Hamilton and Swan with the Office of Special Education, U. S. Department of Education noted that "Unfortunately, for all but the more extreme and severe cases, the detection of young children who will display significant developmental or learning problems later in life has been a limited success." (p. 44.) Hamilton and Swan (1981) also point out that with present measures we are limited in our ability to provide instructional goals for children. They suggest that child-referenced measures be used in addition to norm-referenced and criterion-referenced measures.

Dynamic assessment is proposed as a child-referenced measure that will identify children with mild handicaps and that will provide instructional recommendations. Instead of comparing a child's static test performance across instructional periods and settings (Hamilton & Swan, 1981), in dynamic assessment a learning environment is set up in the testing situation and measures are taken on pre-to-posttest performance and on the amount of instruction that was required from the tester for the child to obtain the posttest performance. Transfer of a child's learning to a new task is also measured.

The present research was based on the assumption that dynamic assessment is more beneficial than normative, static assessment because the results of normative intelligence tests fail to give teachers maximally useful information on how to provide cognitive educational intervention for children and because they may often yield invalid scores for children from minority ethnic groups (Brown & French,

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1979; Feuerstein, Rand & Hoffman, 1979; Mercer, 1975). Contrary to Reid and Hresko's (1980; 1982) proposal that information on cognitive strategic processes cannot be obtained from an assessment, dynamic assessment is viewed as having the potential for determining children's (a) effective cognitive strategies, (b) the level of modifiability of their ineffective cognitive strategies, and (c) the generalizability of the cognitive strategies.

The purpose of this study was to assess the differential effectiveness of two dynamic assessment procedures, the graduated prompt procedure based on the work of Brown and associates (Brown & French, 1979) and the mediation procedure based on the work of Feuerstein and associates (Feuerstein, Haywood, Rand & Hoffman, 1982). These dynamic assessment procedures orginally were developed for children who were older than preschool children. A graduated prompt assessment, based on Brown's approach, includes a series of hints or prompts presented in a graduated sequence of increasing explicitness and is designed to teach the principles needed for task completion (Brown & Ferrara, 1980). A mediational assessment method based on Feuerstein's approach, includes an intentional mediational style to teach the principles needed for task completion. (Feuerstein et al., 1982).

In Feuerstein's (Feuerstein et al., 1982) approach to dynamic assessment we are interested not in the products of prior learning as measured by standardized tests but in the assessment of specific cognitive functions used for learning and in how these cognitive functions change when a child is given help in developing strategies that can be used to enhance learning. In the model proposed by Brown, the emphasis is "not <u>how much improvement</u> one can bring about via intervention, but rather <u>how much aid</u> is needed to bring about a specific amount of learning" (Campione, Brown, Ferrara, & Bryant, 1983, p. 4). Brown and Ferrara (1980) have pointed out the need for this type of assessment for younger children because existing cognitive tests for preschool children are unreliable in detecting children who are performing in a mildly retarded range or who are at academic risk.

The reasons for these problems are: (a) the preschool tests are often not based on cognitive developmental theories, and thus the meaning of their results is difficult to interpret; and (b) the tasks are often not related to cognitive tasks given at a later age (Brown & Ferrara, 1980; see also Bryant, Brown, & Campione, 1983). Therefore, with preschool children who are performing in the mildly retarded range or who are at academic risk, standardized (normative) tests are not effective in identifying those children who need special help in cognitive areas. Such tests are also limited in their usefulness in determining what kind of cognitive educational help is needed (Feuerstein at al., 1979; Haywood, 1977a; Lidz, 1983).

A dynamic assessment model from which we can obtain educational diagnostic information will help teachers provide appropriate educational intervention for preschool mildly retarded children and those who are at academic risk. Testers will be able to obtain information about the specific cognitive functions that a child uses in completing a cognitive task and about the kind of instruction that is needed for a child to develop effective cognitive functions. With this type of information educators can provide intervention that will prevent children from being placed in Special Education. In another Vanderbilt project, entitled "Cognitive Education for Preschool Handicapped Children," academic researchers and community educators are presently developing a curriculum that is focused on children's development of effective cognitive functions. On a concrete level, it is hoped that the information on cognitive functions and deficiencies obtained from a preschool dynamic assessment model will help us to establish individual education program goals for each child in the curriculum project.

Both dynamic assessment and the cognitive education curriculum are based on one theory of cognitive development and intelligence. This theory proposes that the children's development and effective learning depend on nervous system development, learning opportunity, and the quantity and quality of transactions

that children have with adults (Haywood, 1977b; Haywood & Wachs, 1981). Those variables that influence the development of cognitive functions and the effectiveness of learning appear to be correlated with social class, and also to be correlated with difficulty in school learning in groups of children who are categorized as educable mentally retarded, slow learning, and culturally different (Burns, 1980; Feuerstein & Rand, 1974; Haywood & Wachs, 1981; Hess & Shipman, 1965; 1968; Loasa, 1980). The primary cause of children's retarded cognitive performance is their lack of high quality transactions with adults, that is, mediated learning experience (Feuerstein & Rand, 1974).

Mediated learning is a process by which an older person interprets life events or otherwise teaches basic mental operations to a child. It is facilitated when an adult interprets for the child the meaning of a wide variety of experiences and helps the child to understand how such experiences can be generalized (Haywood, 1977b). In the mediational interaction, both teachers and children have active roles in transactions. Teachers who provide mediated learning experience use a teaching style in which they: (a) have the intention to produce change in children's thinking processes; (b) transcend the learning event by relating the event to general abstracted concepts; (c) communicate that the learning experience has meaning and purpose; (d) give the children a feeling of competence by pointing out the appropriate thinking processes that they use; and (e) regulate children's behavior by focusing their behavior on the thinking processess that they need to use for a particular situation or activity when this is necessary (Feuerstein, Rand, Hoffman, & Miller, 1980). High quality mediators also provide instruction based on the needs of children. If a task is very difficult for children a different type of instruction is needed than if the task is easier; the type of instruction provided should be contingently related to the childrens' abilities (Wood, 1980). One empirical basis of support for this theory

is the mother-child interaction research (Haavind & Hartman, 1977; Sameroff, 1978; Sigel, in press; Wertsch, 1979a; 1979b; 1981; Wood, 1976; 1980; Wood & Middleton, 1974; Vygotsky, 1978) in which Vygotsky's social foundations of higher intellectual processes were examined.

Children who do not receive a sufficient amount of quality mediated learning may have weak or ineffective cognitive strategies (Feuerstein et al., 1982; Feuerstein & Rand, 1974; Feuerstein, Rand, & Hoffman, 1979). Ineffective or weak cognitive functions contribute to some children's poor performance on intelligence tests, and their low scores reflect inadequantely developed thought processes and predict poor school achievement. Generally the deficiencies are not inherent defects but, rather, ineffective attitudes, faulty work habits, and inadequate modes of thinking. The ability to perform cognitive functions adequately is not considered to be lacking but, rather, is underdeveloped or impaired (Feuerstein et al., 1979).

These ineffective cognitive strategies can be seen in preschool children, especially mildly retarded children and those at academic risk. The types of problems that these children can exhibit are illustrated in an example of a child given the task of building a block design from a picture model. While the teacher explains the task, the child manipulates the picture. The child rapidly starts to arrange the blocks before the teacher finishes the instructions. The child looks at the picture only once instead of continualy comparing his/her own production to the picture. The final block designs bears only partial resemblance to the picture being copied.

This example illustrates several ineffective or weak cognitive functions. The child's behavior was unplanned, impulsive, and unsystematic, as shown in the child's starting the task before the instructions were finished and quickly completing the task. The child did not continually compare his/her design to the picture being copied and was satisfied with a design that only partially resembled

the picture (Burns, 1980; Feuerstein et al., 1979).

This block building example is taken from Burns (1980) who studied children's approach to and performance on intelligence test items presented to preschool children. Specific behavioral categories (e.g., child spontaneously giving information, child overdependence on seeking confirmation, child characterized as using trial and error learning, and child inappropriately manipulating materials) can be observed and then used to examine children's cognitive functions/deficits. When the four behavioral categories mentioned above were used to predict children's performance on the intelligence test items, the behavioral categories were associated with 80% of the variance in children's performance. Children who were overdependent on seeking confirmation, who relied on trial and error, and who inappropriately manipulated the materials tended to perform more poorly on the task than did children who exhibited these types of behavior less frequently. Children who often spontaneously gave information about the task tended to perform better or the task than did children who exhibited this type of behavior less frequently. Two of these behavioral categories (i.e., child overdependent on seeking confirmation and child relying on trial and error) were significantly related to SES.

In order to examine these cognitive functions comprehensively, we provided testing in which children received mediated learning experience. Recall that a teacher or tester who provides mediated learning experience uses a teaching style that meets Feuerstein's criteria for mediated learning experience: intentionality, transcedence, communication of meaning and purpose, mediation of a feeling of competence, and regulation of behavior (Feuerstein & Rand, 1974). A mediator for preschool children also provides instruction that is contingently related to the child's ability (Wood, 1980). Very little mediated learning experience is provided to children in most standard testing procedures. Various degrees of mediated learning experience are provided in dynamic assessment procedures. Judged on the

criteria for providing mediated learning experience, testers who use the mediation method for dynamic assessment seem to provide higher quality mediation than do testers who use the graduated prompts method.

Relevant Research

Research on dynamic assessment has been performed by a number of researchers (Brown & Ferrara, 1980; Bryant, 1982; Bryant, Brown, & Campione, 1983; Budoff & Corman, 1973; 1975; Delclos, 1983; Ferrara, 1983; Feuerstein et al., 1979; Hall & Day, 1982; Haywood & Maisto, in press). Most of the studies have been addressed to primary and secondary school aged children. These studies are presented in the research summary chart on the next 3 pages. Budoff's early studies on learning potential (Budoff, 1967; Budoff & Friedman, 1964; Budoff & Hamilton, 1976; Hamilton & Budoff, 1974) and the Kaufman Assessment Battery for Children (Kaufman & Kaufman, 1983) are included because, although they give instruction or prompts during the assessment, the instruction is not directed toward teaching children the principles, rules, or strategies of the tasks (for a review of the Budoff literature see Delclos, 1983 or Vye, in press). In general the results of the studies in the chart show that: (a) groups of children who receive dynamic asssessment exhibit learning potential not detected in static assessment, and (b) performance on dynamic assessment varies with different categorical groups of children (e.g., culturally different, educationally mentally developing, learning disabled, normally developing).

Bryant's (1982; Bryant et al., 1983) study with preschool children will be presented in detail since it is the most relevant to the present research. They studied 55 normally developing five year old children in a multiple regression design. Their purpose was to use the graduated prompt dynamic assessment procedure to examine Vygotsky's (1978) construct of "zone of proximal development". They examined whether IQ task scores plus learning and transfer measures taken during

Research on Dynamic Assessment

Source	Type of Dynamic Procedure	Participants	Purpose	Design	Results
Bryant, Brown, Campione, 1983; Bryant, 1982	Graduated Prompt-individual administration and training	55 normally developing five year old children	To ascertain whether dynamic assessment measures add accuracy to IQ measures in predicting performance	Multiple regression - criterion variable was gain score on task that was taught. Predictors were IQ task measures, learning measures, and transfer measures	Learning and transfer measures taken during dynamic assessment add accuracy to IQ task measures in predicting performance
Budoff & Corman, 1973	Mediational - group administration and training on Raven's Coloured Progressive Matrices	379 first - through fifth grade students of below average achievement from both lower and higher SES backrounds	To ascertain whether group training procedures were effective in improving performance and whether improvements were related to race or SES.	Multiple regression - criterion variable was posttest performance. Predictors were pretest, age, sex, SES, race, and training condition.	Children who received training performed significantly better at posttest. Treatment was effective for middle and higher SES children but not for lower SES children
Budoff & Corman, 1975	Mediational - group and individual administration and training on Raven's Coloured Progressive Matrices	Reanalysed the data from low children in 1973 study and added 174 five through 14 year old special education students	To ascertain whether training is effective in (a) increasing posttest performance and (b)having children's errors be closer to the correct solution	Analysis of variance - dependent variables were the number of correct responses and types of errors. The independent variables were group (trained, not trained) and trial (pre and posttest)	Children who received training had significantly more correct answers at posttest and less errors at posttest. Data on the types of errors were inconclusive. Children in individual or group training did not differ.
Delclos, 1983	Mediational - group and individual administration and training on Representational Stencil Design Test	Twenty-six 11 to 14 year old special education students	To ascertain whether group training procedures were effective in identifying individual differences not evident in static assessment and whether individual training procedures identify learning potential not identified in group procedures. To see if errors before and after training correspond to the content of the training.	Analysis of variance - dependent variables were performance scores and error categories. Independent variable was group (trained, not trained) and trial (pretest and posttest)	Children who received training scored significantly higher at posttest and their errors before and after training corresponded to the content of the training. The minimal amount of individual training that was given did not enhance the performance of nonlearners from the group training.

Ferrara, Brown & Campione, 1983; Ferrara, 1983	Graduated Prompt - individual training with some group testing on letter series completion task	29 third - graders of average and above average IQ's	To examine differences in normally developing children's zones of proximal development	Analysis of variance - dependent variables were number of prompts (dynamic test) or number of correct correct responses (static test). Independent variables were IQ, age, and presentation type. Chi-square analyses done with median splits on learning speed (fast & slow) and transfer level (low or high)	Learning speed was significantly related to IQ and grade level. On static maintenance and near transfer, there was a 3 way interaction between transfer breadth, IQ, and grade level. On dynamic maintenance there were no significant effects. On dynamic far transfer there were IQ and grade level effects. The chi-square analysis showed that 53% of the children were accurately classified as fast/slow learners and high/low transferers by IQ.
Feuerstein, Haywood, Rand, & Hoffman, 1982	Mediational - group administration and training on Variations I and II of the Learning Potential Assessment Device	337 students in 5th, 6th, 7th, and 8th grades	To ascertain whether mediational or static assessment effects performance immediately after training and 1 month after training	Analysis of variance - dependent variable was matrix test performance. Independent variables were grade level and training group (mediation or static)	Analyses showed significant grade level effects and training effects for all children on the immediate test. In the 1 month follow-up, results were inconclusive for the 5th and 6th graders but there was a significant training effect for the 7th and 8th graders.
Feuerstein, Rand, & Hoffman, 1979	Mediational - group administration and training on Variations II of the Learning Potential Assessment Device	178 adolescents in 7th, 8th, or 9th grade. Children were characterized as normally developing or culturally deprived, or in a group in which their classification was being questioned	To ascertain whether a low functioning group was culturally deprived or culturally different	One way analysis of variance - dependent variable was Variations II performance and independent variables was group (normally developing, culturally deprived, group in question)	Analyses showed a high level of modifiability on Variations II in the group in question even though their Primary Mental Abilities scores were low. The conclusion was that the questioned children were culturally different rather than culturally deprived.

Feuerstein, Rand, & Hoffman, 1979	Mediational - individual administration and training on 4 Learning Potential Assessment Device (LPAD) items	55 culturally deprived low functioning adolescents and 36 EMR adolescents	To examine whether these two diagnostic groups had different cognitive structures and whether these structures were differentially modifiable.	One way analysis of variance - dependent variables were the LPAD test scores and subscores. Independent variable was diagnostic group	EMR children were lower functioning on static tests. With mediational assessment the groups were similar except for 1 test and 1 subtest in which the EMR adolescents scored significantly lower than the culturally deprived adolescents
Hall & Day, in press	Graduated Prompt - individual administration and training on balance beam task	Forty second grade children who were classified as EMR, LD, or normally developing	To examine differences in children's zones of proximal development (EMR children will require more assistance to learn and will have more difficulty in transfer than will LD or normally developing children).	Kruskal Wallis Analysis of variance by ranks - dependent variables were performance on (a) amount of assistance needed to learn, (b) maintenance, (c) near transfer and (d) far transfer. Independent variable was group (EMR, normally developing).	Children were at the same skill level on balance beam task at pretest and all groups were similiar in (a) the assistance needed to reach criteria, (b) maintenance, and (c) near transfer. There was a difference between EMR and normally developing children on far transfer.
Haywood & Maisto, 1983	Mediational - group administration and training on Variations I of the Learning Potential Assessment Device	Ninety-four 12 to 18 year old low achievers (residential school). 72 normally developing 13 to 15 year olders and 34 low achieving 13 to 15 year olders (public schools).	To examine the effectiveness of mediational testing (other issues were addressed in study but will not be presented here)	Analysis of variance - dependent variable was performance on Variations I of Learning Potential Assessment Device. Independent variable were training group (teaching or no teaching) and grade and ability levels.	Learning Potential Assessment Device teaching has significant effects on posttests on Variations I and on Raven's Standard Progressive Matrices. Uniform gains were found across grade and ability levels.
Keane, 1983	Mediational-individual administration and training on 5 Learning Potential Assesssment Device items	Forty-five 9 to 13 year olds who were severly to profoundly deaf	To ascertain whether individual mediational training enhances deaf children's performance on (a) the trained test, (b) transfer tests, and (c) planning behavior	Analysis of covariance - dependent variables were performance on (a) LPAD tests, (b) transfer tests, (c) planning behavior. Independent variable was treatment group (mediational, testing the limits, standard assessment	Children who received mediational training performed more effectively on 4 of 5 LPAD tests, on 1 of 2 transfer tests, and on planning behavior when compared to the two comparison groups.

graduated prompt assessment predicted task-specific improvement more accurately than did IQ task scores alone.

Children were tested during 4 sessions. In session 1 children received the IQ tasks and a 15 item task-specific pretest (matrix items). In session 2 children received training on matrix problems until they reached criterion (3 consecutive correct answers in which no prompts were given). Children who did not reach criterion in nine items, were dropped from the study. Children who did not reach criterion performed significantly less well on an IQ task measure than did children who reached criterion. Therefore, children with lower IQ's and who were slower learners were dropped from the study. In session 3 children received near transfer items of the matrix problems, these were novel combinations using the same rules as in the training. In session 4 children received far transfer items, these were items using a new but related rule. In session 4 children also were readministered the task-specific matrices test that was given in session 1 as a pretest.

Bryant, Brown, & Campione's (1983) results showed that the learning and transfer measures taken in the graduated prompt dynamic assessment procedure added accuracy to IQ task measures in predicting residual gain performance on a task-specific matrices task. When IQ task measures were used as predictors in a multiple regression design with the residual gain score as the criterion measure, 37% of the variance in the matrices gain score was associated with the IQ task measures. When the learning and transfer measures were added to the multiple regression model, 79% of the variance in the matrices gain score was associated with the prediction measures (learning measures added 22.4% of variance accounted for in the model; transfer measures added 17.3% of the variance accounted for in the model).

Goals of Present Study

Two dynamic assessment models, the prompt method based on the work of Brown and associates (Brown & Ferrara, 1980; Brown & French, 1979) and the mediation method based on the work of Feuerstein and associates (Feuerstein, Haywood, Rand & Hoffman, 1982: Feuerstein, Rand & Hoffman, 1979) were compared to each other and to a static testing method. Independent task performance and transfer task performance were measured on children participating in the study. These two dynamic approaches are based on the same theory of cognitive development (i.e., the importance of a mediator for learning experiences that promote development of cognitive structures) but differ in the specific techniques used for dynamic assessment. The quality of mediated learning experience provided in the two types of dynamic assessment differs. Higher quality mediation is provided in the mediational procedure than is provided in the graduated prompt procedure. Therefore, structural cognitive change that is generalizable is more likely to take place in the mediational procedure.

The four main hypotheses of this study are:

1. Mediational and graduated prompt dynamic assessment procedures reveal learning ability that is not apparent in static assessment.

2. Analyses of children's independent performance and transfer task performance reveal a direct relationship to the type of training provided in assessment.

3. Analyses of children's off-task behavior during independent performance and transfer task performance reveal a direct relationship to the type of training provided in assessment.

4. The results of the type of assessment that children receive are not dependent upon the amount of time that children are exposed to training.

Methods

Participants

One hundred and twenty seven 4- to 6-year-old children who attend public supported preschools and local public schools participated in this study. Generally, children were chosen to participate in the study because they were in special education classes or their teachers felt that they had significant learning problems. Children with known organic handicaps were not included in the study. All children received a cognitive screening (Kaufman, 1977) and those whose test scores indicated mental retardation or academic risk were given the full cognitive section of the McCarthy Scales of Children's Abilities (McCarthy, 1972). On the McCarthy Screening or the full General Cognitive Index (GCI) 49 children scored too high and 16 children scored too low to participate in this study and these children did not receive further testing. One child did not receive testing past the initial screening because his father asked that the child not participate in futher testing. Another child participated in the complete testing procedure but her data were eliminated from analyses because of experimental error.

Sixty children who were mentally retarded or at academic risk participated in the experimental testing sessions. Children were mildly retarded or at academic risk; therefore it was expected that they had identifiable cognitive deficiencies that were caused by a lack of high quality mediated learning experience rather than organic deficits. These children were randomly assigned to three treatment groups: (a) the graduated prompt method, (b) the mediational method, or (c) the standard method. There were no significant differences among the three groups on GCI (F=

One-fourth of the children were tested by an examiner who did not know the hypotheses of this study. There were no significant differences between the different examiners' groups of children on GCI (t=.22, df=58), MA (t=1.45, df=58), independent task performance for children receiving static assessment (t=1.84,

df=18), independent performance for children receiving graduated prompt dynamic assessment (t=1.00, df=18), independent performance for children receiving mediational dynamic assessment (t=-.29, df=18), transfer performance for children receiving static assessment (t=1.53, df=18), transfer performance for children receiving graduated prompt dynamic assessment (t=2.02, df=18) or transfer performance for children receiving mediational dynamic assessment (t=.90, df=18).

Materials

The cognitive task used in these assessment procedures is an adaptation of the Stencil Design Test-1 of the Arthur Point Scale of Performance Tests Form 1940 Revision (Arthur, 1945). The test was changed for these young children by making seven new items. Each item consisted of a design that required putting two stencils together. Arthur's initial items, which were also made with two stencils, were administered along with the seven new items. The other Arthur items (i.e., designs using more than two stencils) were omitted. All stencil designs used are shown in Appendix A.

This stencil task was chosen because (a) it is similiar to ones used to test older children (Arthur, 1945; Feuerstein, Rand, & Hoffman, 1979) and (b) identifiable cognitive processes are needed for task completion.

The transfer task was the Animal House matching board from the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967). Instructions for task are in Appendix B. This task was chosen among others that had been pilot tested because (a) it is age appropriate and has national norms, (b) there is variability in children's scores on this test, (c) it is usually not taught in preschool classrooms, and (d) it includes many of the cognitive functions examined in the stencil design task. The cognitive functions in the input (I), elaboration (E), and Output (O) areas can be examined in each task are listed in the following chart.

	Stencil Design	Animal House
I.	Systematic Exploration need to look at all cards	Systematic Exploration need to look at color options
	Labeling color/shapes	Labeling colors/animals
	Spatial referents which goes over what	
	Conservation shapes remains the same even though color of solid changes	
	Consider more than one thing at a time solid & cut-out together	Consider more than one thing at a time peg & animal together
	Precision & accuracy need fine descriminations of shape	
E.	Problem definition determine from instructions what they have to do	Problem definition determine from instructions what they have to do
	Interiorization need to keep cut-out & solid in mind while working	Interiorization keep in mind color needed
	Planning behavior takes steps needed to complete design	Planning behavior takes steps needed to put correct color

	Comparative behavior uses model	Comparative behavior uses model
0.	Restraining impulsive behavior does not use trial & error behavior - plans, etc.	Restraining impulsive behavior does not pick out peg before looking at what color is needed, plans, etc,

Procedures

Experimental methods were implemented in order to compare the two dynamic assessment procedures (i.e., graduated prompt method, mediational method) to each other and to a static assessment procedure. Comparisons were made on (a) the children's performance on independent performance on the trained task and performance on the transfer test, (b) observational data on the cognitive functions and deficiencies that the children exhibit on independent performance on the transfer test performance, and (c) the amount of time that it takes to assess the children using each procedure.

Graduated prompt assessment procedure. The procedures, based on the work of Ann Brown and her associates, include a series of hints or prompts that are arranged in a graduated sequence of explicitness. These graduated prompts are used in teaching the principles needed for task completion (Brown & French, 1981). One prompt is given to the child each time s/he cannot complete the task. In the illustration provided below, the order of prompt presentation was determined by (a) using the explicitness ratings of 12 teachers and 8 staff members who work with preschool children, and (b) through consultation with Brown. Before the prompts are used an initial test demonstration is presented to the children. This demonstration procedure and the prompt procedure for the stencil test are presented below.

Graduated Prompt Procedure for Stencil Test

Demonstration

LET ME SHOW YOU WHAT WE ARE GOING TO DO.

FIRST, I WANT YOU TO LOOK DOWN HERE. HERE WE HAVE SOLID CARDS OF DIFFERENT COLORS. (Point out each solid individually.) AND HERE WE HAVE CUT-OUT CARDS. YOU SEE THEY HAVE DIFFERENT SHAPES CUT-OUT OF THEM. (Hold up a cut-out for child to see.) WE HAVE DIFFERENT CUT-OUTS. (Point out each cut-out individually.)

WE CAN PUT OUR SOLIDS (indicate with a sweeping gesture) AND OUR CUT-OUTS (indicate with a sweeping gesture) TOGETHER TO MAKE SOMETHING THAT LOOKS JUST LIKE THIS (place sample model on the board).

NOW, LET'S DO THIS ONE TOGETHER. FIRST OF ALL, I WANT YOU TO LOOK DOWN AT YOUR SOLIDS (point with slow sweeping gesture) AND FIND ONE THAT HAS THE SAME COLOR AS THE PART THAT I AM TOUCHING. (Touch middle part of sample stencil.)

Stay on this task until the child selects the correct solid. If child looks for a cut-out rather than a solid, say FIRST, LOOK AT OUR SOLIDS. If a child selects the wrong solid say, WE NEED ONE WITH THIS COLOR (point on model). If the child does not succeed on own, point to the correct solid and say, WE NEED THIS SOLID. When the child has selected the correct solid, point to the middle of the board and say, MAKE YOURS RIGHT HERE.

NOW, LET'S FIND IN OUR CUT-OUTS (point with slow, sweeping gesture) ONE THAT HAS THIS COLOR AND THESE LINES (indicate on the model).

Stay on this task until the child selects the correct cut-out. If the child looks for a solid rather than a cut-out, say LET'S LOOK IN OUR CUT-OUTS. If the child selects an incorrect cut-out, say WE NEED ONE WITH THIS COLOR AND THESE LINES (show on model). If the child does not succeed on his/her own, say WE NEED THIS CUT-OUT.

When the child has selected the correct cut-out, point to the spot in the middle of the board, and say, MAKE YOURS RIGHT HERE.

NOW LET'S LOOK. YOU PUT A SOLID (point to solid part of the child's design) AND A CUT-OUT (point to the child's design) TOGETHER, AND YOU MADE YOURS (point) LOOK JUST LIKE MINE (point).

LET'S DO THIS ONE AGAIN, JUST TO MAKE SURE YOU KNOW HOW TO DO IT. FIRST LET'S PUT THE SOLID BACK WITH OUR SOLIDS AND OUR CUT-OUT BACK WITH OUR CUT-OUTS.

NOW, FIND A SOLID (point to solids with sweeping gesture) AND A CUT-OUT (point to cut-outs with sweeping gesture) AND MAKE ONE THAT LOOKS JUST LIKE THIS ONE.

Assist child as needed, e.g., FIND YOUR SOLID. FIND THIS COLOR HERE (point to solid part of model) FROM THE SOLIDS HERE (point to solids).

OKAY, PUT IT HERE (indicate middle of board). If child selects a wrong solid say, WE NEED ONE WITH THIS COLOR (show on model then indicate the correct solid).

FIND YOUR CUT-OUT. YOUR CUT-OUTS ARE HERE (point with sweeping gesture). Insist until child finds correct cut-out. If child tentatively selects correct card, say RIGHT, MAKE YOURS RIGHT HERE (indicate the spot in middle of board). If the child selects a wrong card say, WE NEED ONE WITH THIS COLOR AND THESE LINES (show on model, then indicate the correct cut-out).

When the child has placed the cut-out correctly over the solid, say, GOOD, NOW LET'S LOOK. YOU PUT A SOLID (point to his/hers) AND A CUT-OUT (point to his/hers) TOGETHER, AND YOU MADE YOURS (point) LOOK JUST LIKE MINE (point). AND THAT IS WHAT WE ARE GOING TO DO.

FIRST, LET'S PUT OUR SOLID BACK . . . AND OUR CUT-OUT BACK. . .

NOW, SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS (introduce first stencil model).

Instructions

The presentation of four stencil models is followed by a graduated series of prompts to guide the child to the completion of the reproduction of the model using selected combinations of 12 separate stencils. Following each failed attempt to reproduce the model, the child is given a more explicit prompt, until he/she completes the task successfully. If the child refuses to make a design, continue to the next prompt.

Show each model to the child and say, SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS ONE (point to the model). When the child appears to have finished, allow 10 seconds and then ask, DOES YOURS LOOK JUST LIKE THIS ONE (the model)? If the child's reproduction looks just like the model, present the next model.

If the child's reproduction includes one correct stencil, say, YOURS LOOKS ALMOST LIKE THE MODEL, BUT IT DOESN'T LOOK JUST LIKE IT. If the child's reproduction includes no correct stencil, say, IT DOESN'T LOOK JUST LIKE THE MODEL. Return the stencils the child used to their original positions, give the child a prompt, and again ask the child to make one that looks like the model. Repeat this procedure until the child successfully completes the task.

If the child seeks confirmation for a choice of stencil (e.g., child points to a stencil and asks the examiner if it is the right one), simply say to the child, YOU FIND IT. If the child attempts to make the reproduction on top of the model, ask the child to make it in the appropriate place (point it out) and not on top of the model.

Graduated Prompts

1. DO YOU REMEMBER HOW YOU DID IT WITH THE LAST ONE? If so, HOW DID YOU DO IT? If not, point out and label the solid cards and the the cut-outs, then explain that a solid and a cut-out are put together to make one that looks just like the model.

2. LOOK AT ALL THESE CARDS (point). EVERYTHING YOU NEED TO MAKE THIS ONE IS HERE. SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS ONE.

3. SEE THIS MODEL (point to the model)? DOES ONE OF THESE (point to stencils) LOOK JUST LIKE THE MODEL? If child responds no, say RIGHT, NONE OF THEM LOOKS JUST LIKE THE MODEL. If the child responds yes, say NO, NONE OF THEM LOOKS JUST LIKE THE MODEL. Then say, YOU SEE IN THE MODEL WE HAVE A (point out and name the color) SOLID AND A (point out and name the color) CUT-OUT. YOU NEED TO PUT SOME OF THESE TOGETHER (point to solids and cut-outs) TO MAKE ONE THAT LOOKS JUST LIKE THE MODEL. SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS MODEL.

4. LET'S LOOK AT THESE AGAIN. THESE ARE THE SOLID COLORS (point). DOES EACH SOLID HAVE ONE COLOR OR TWO COLORS? LOOK AT THIS ONE, FOR EXAMPLE. (Hold up white solid, #5.) If child does not respond correctly, give correct answer.

   THESE ARE THE CUT-OUTS (point). DOES EACH CUT-OUT HAVE ONE COLOR OR TWO COLORS? LOOK AT THIS ONE, FOR EXAMPLE. (Hold up red cut-out, #17.) If child does not respond correctly, give correct answer.

   DOES THE MODEL HAVE ONE COLOR OR TWO COLORS? LOOK AT THIS ONE, FOR EXAMPLE. (Hold up red-over-white sample model.) If child does not respond correctly, give correct answer.

   YOU NEED ONE SOLID AND ONE CUT-OUT TO MAKE ONE THAT LOOKS JUST LIKE THE MODEL. SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS MODEL.

5. LET'S LOOK AT THE MODEL AGAIN. POINT TO (OR NAME THE COLOR OF) THE PART THAT LOOKS LIKE A CUT-OUT. Point if the child responds incorrectly. POINT TO (OR NAME THE COLOR OF) THE PART THAT LOOKS LIKE IT COMES FROM A SOLID. Point if the child responds incorrectly. NOW SEE IF YOU CAN MAKE ME ONE THAT LOOKS JUST LIKE THE MODEL.

6. LOOK AT THIS MODEL. (Show red-over-white sample model.) LETS SEE WHAT SOLID I NEED TO MAKE THIS ONE. IS IT THIS ONE? Explore the other solids and whether they are correct. LOOK AT WHAT HAPPENS WHEN I TAKE A WHITE SOLID AND I PUT A RED CUT-OUT ON TOP OF IT. PART OF THE WHITE SOLID GETS COVERED UP. THAT IS HOW I MAKE ONE JUST LIKE THIS MODEL. (Point to original model.) If the child uses the correct solid, skip prompt 7 and use prompt 8.

7. LOOK AT THIS MODEL. WHICH SOLID COLOR DO YOU NEED TO MAKE THIS MODEL? If the child does not answer say, SHOW ME ON THE MODEL. Demonstrate if child responds incorrectly. THESE ARE THE SOLID COLORS (point). PICK ONE OF THESE. AND SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THE MODEL.

8. THIS (name the color of the solid) ONE IS PART OF THE MODEL. (Place the correct solid in the center of the board if it is not already there.) LOOK AT THIS PART OF THE MODEL (point to part that looks like a cut-out). FIND A CUT-OUT FROM HERE (point) THAT LOOKS JUST LIKE THIS PART OF THE MODEL. SEE IF YOU CAN MAKE ME ONE THAT LOOKS JUST LIKE THE MODEL.

9. PUT THIS (name color) CUT-OUT ON YOUR SOLID COLOR. SEE, YOURS LOOKS JUST LIKE MINE.

Testers' adherence to the graduated prompt procedure was examined using the Prompt Tester Criteria form (Appendix C).

Mediation assessment procedure. The mediation procedure, based on the work of Feuerstein and associates, includes contingent mediated teaching of the principles and strategies needed for task completion (Feuerstein, Haywood, Rand, & Hoffman, 1981). The amount and type of mediation provided varied with different children according to their needs. The following is an example of what the tester said and did while providing mediated learning on the Stencil Design task.

Mediation Procedure for Stencil Design Test

Familiarizing the Child with Materials and Relevant Dimensions

1. Point out cut-outs (I CUT THEM OUT).

2. Label shapes. If there is resistance or difficulty learning labels, then tell the child the label, but go quickly to finding shapes that match and say FIND ALL THE CARDS LIKE THIS. Comment on the lack of labels in a report, but do not get bogged down--the matching encourages comparative behavior while establishing shape as a relevant feature.

Helping the Child Reproduce the Model

1. Display model while reproduction is still on the table, discussing how a picture was made of it. Point out that there are 2 colors in the picture and 2 colors in the reproduction, but only 1 color on each separate card.

2. Put stencils back in place and request reproduction. Teach search pattern over cut-outs and over solids. Have child say "Is it this one?"

3. When production is made, encourage checking back to model. Go over what is right and what is wrong about the production.

* * *WARNING* * *

If the child's production is wrong, you need more work on the preceeding concepts. Refer to any errors made in route to a correct answer (spontaneous corrections) and discuss why they were wrong. Alternate the correct one and the wrong one.

4. Repeat Step 3 with each of the remaining training models.

Combination Rules

1. Demonstrate what happens when a green circle is placed on a yellow solid. Point out 2 colors, made from 1 + 1.

2. Change solids, showing that the inside color changes by changing solids. Allow child to try 1 or 2 color changes. Emphasize that it it solid that is changing.

* * *WARNING* * *

If child cannot change the color of the solid, you need more work on the preceeding concepts.

3. Use white solid with green circle. Change cut-outs (don't reproduce any of the upcoming designs). Show that outside color changes by changing cut-outs.

4. Put solid on top of cut-out and establish necessary order rule and reason. Have child repeat the rule "I put a cut-out on top of a solid and the color of the solid is in the middle."

5. End with the sample design formed from stencils, then introduce the sample design model.

Helping the Child Reproduce the Model

1. Display model while reproduction is still on the table, discussing how a picture was made of it. Point out that there are 2 colors in the picture and 2 colors in the reproduction, but only 1 color on each separate card.

2. Put stencils back in place and request reproduction. Teach search pattern over cut-outs and over solids. Have child say "Is it this one?"

3. When production is made, encourage checking back to model. Go over what is right and what is wrong about the production.

* * *WARNING* * *

If the child's production is wrong, you need more work on the preceeding concepts. Refer to any errors made in route to a correct answer (spontaneous corrections) and discuss why they were wrong. Alternate the correct one and the wrong one.

4. Repeat Step 3 with each of the remaining training models.

Testers' adherence to the mediation assessment procedure was examined using the Mediation Tester Criteria form (Appendix C).

Observational Scale and Reliability Training

The observational scale used in the study is a refinement of one used in other projects that our research group is undertaking (see Burns, 1980; 1981). This measure is important because it helps us relate child behavior to specific cognitive functions/deficits so that a reliable and valid measure of cognitive functions can be obtained. In previous studies we have been able to measure these behavioral categories reliably (Burns, 1980; 1981). We have also found that specific behavioral categories (i.e., child spontaneously giving information, child overdependence on seeking confirmation, child inappropriately manipulating materials, child characterized as using trial and error learning) were associated with 80% of the variance in children's performance on intelligence test items (Burns, 1980). Frequency counts of the incidents in each behavioral categories were collected. Names of individual behavioral categories and category definitions are in Appendix D.

We infer cognitive functions and indices of motivation from the behavior categories. For example, consider the category called Child overdependence on seeking confirmation. This is a measure of the number of times that a child asks for or looks for confirmation from the tester. A great need for confirmation may be indicative of a child's need for task-extrinsic incentives. This extrinsic motivational orientation interferes with performance on the type of problem-solving tasks presented in these studies and in school tasks (Burns, 1980; Haywood & Burke, 1977). An effective cognitive function would be indicated when the child has high frequencies in the categories labeled Child spontaneously giving information. Higher frequencies in this category indicate precision in planning and responding to a test item. A cognitive deficiency is indicated in the category labeled Child inappropriately manipulating materials. High frequencies of this behavior indicate an unplanned and impulsive method of information gathering and responding.

An excess of this behavior is indicative of trial and error responding (Brown & DeLoache, 1978; Feuerstein et al, 1979).

Before experimental tapes were observed, an interrater observer agreement of atleast .85 was obtained using Pearson product-moment correlation coefficients. Interrater reliability was obtained on four randomly assigned children in each assessment group in the first half of the study and 4 randomly assigned children in each assessment group in the second half of the study. The average reliability score was .96.

Expected Findings

The specific findings expected were:

1. There will be systematic differences in the number of learners and nonlearners as a function of the assessment procedure that they receive. There will be more learners in the mediational and graduated prompt groups than there will be learners in the static group.

2. On the independent performance test, the children in the graduated prompt and mediational methods will have more correct items than will children in the standard method and the children in the mediational method will perform better than will the children in the graduated prompt and standard methods. These differences will appear because of the amount and quality of mediation provided in the different testing conditions. In the standard testing method a lower quality of mediation is provided to the children than in the graduated prompt testing method. In the graduated prompt testing method a lower quality of mediation is provided to the children than in the mediation method.

3. Differences in transfer scores (between the test given prior to assessment/training and the test after assessment/training) will be greater for children in the mediational and prompt methods than for the children in the standard method and pre-to-post transfer test performance will be greater for the children in the mediational method than for the children in the graduated prompt

method. These differences will appear because the amount and quality of mediation will also affect performance on a transfer task.

4. On the independent performance test, the behavior of the children in the graduated prompt and mediation methods will reflect more effective cognitive functions than will the behavior of the children in the standard method and the behavior of the children in the mediational method will reflect more effective cognitive functions than will the behavior of the children in the graduated prompt method.

5. On the transfer test, the behavior of the children who received the graduated prompt method and the standard method will not reflect more effective cognitive functions than they did on the pre transfer test and the behavior of the children who received the mediation method will reflect more effective cognitive functions at posttest than they did on the pre transfer test. These differences will appear because of the amount and quality of mediation provided during the training. Since the children in the graduated prompt method will not have received training that was contingent on the deficiencies they exhibited, there is no reason to expect that their behavior during a transfer task will reflect more effective cognitive functions.

6. There is no reason to expect that there will be a significant relationship between the amount of time that it took to train children and their independent performance or transfer test scores.

Results

Dependent variables were children's: (a) classification as learner or nonlearner; (b) achievement on independent performance; (c) achievement on pretest and transfer posttest; (d) observed off-task behavior; and (e) amount of time in training.

Learners were defined as children who needed minimal or no help on the third or fourth training item. In the static assessment group, 5 children were learners and 15 children were nonlearners; in the graduated prompt assessment group, 16 children were learners and 4 were nonlearners; in the mediation assessment group, 15 children were learners and 5 were nonlearners. A 3 x 2 chi-square analysis was performed to examine the relationship of assessment group to whether children were learners or nonlearners. The obtained X^2=15.42, df=2, was significant at the .01 level.

When the data were analyzed with all children (learners and nonlearners) who participated in the study, the following results were found on independent performance. In the 3 group (static, graduated prompt, mediation) analysis of variance in which independent performance was the dependent variable, there was a significant main effect for group (F=8.44, df=2/57, p_ .01). In order to determine how the 3 groups differed, multiple t-tests (one-tailed) were performed across groups. As shown in Table 1, the graduated prompt assessment group scored higher than did the static assessment group (t=-1.89, df=38, p_ .05). The mediation assessment group scored higher than did the graduated prompt assessment group (t=-2.08, df=38, p_ .05). When these independent performance data were analyzed for learners only, the results were similiar to those for the entire group: children in the mediational assessment group performed significantly higher than did those in the graduated prompt assessment group (t=-1.93, df=28, p_ .05).

TABLE 1

MEAN NUMBER OF DESIGNS CORRECT
ON INDEPENDENT PERFORMANCE

ASSESSMENT GROUP	M	T	P
Static	1.15		
Graduated Prompt	2.00	-1.89	.05
Static	1.15		
Mediational	2.95	-2.08	.05
Graduated Prompt	2.00		
Mediational	2.95	-1.93	.05

On the 3 x 2 analysis of variance (Treatment Group by Trial) with transfer task performance as the dependent variable, there was a signficant main effect for trial ($F=24.92$, $df=1/57$, $p < .01$) and a significant Group X Trial interaction ($F=6.30$, $df=2/57$, $p < .01$). Both graduated prompt ($t=-1.83$, $df=19$, $p < .05$) and mediational assessment ($t=-4.62$, $df=19$, $p < .01$) groups had significant pretest to transfer posttest gains. However, as shown in Table 2 and Figure 1, on the transfer performance, the mediation group scored higher than did both the static and graduated prompt groups, but there was not a significant difference between the static and graduated prompt groups.

TABLE 2

MEAN PERFORMANCE SCORE
ON TRANSFER POSTTEST

ASSESSMENT GROUP	M	t	p
Static	46.84		
Graduated Prompt	47.57	- .16	NS
Static	46.84		
Mediation	57.44	-2.58	.01
Graduated Prompt	47.57		
Mediation	57.44	-2.87	.01

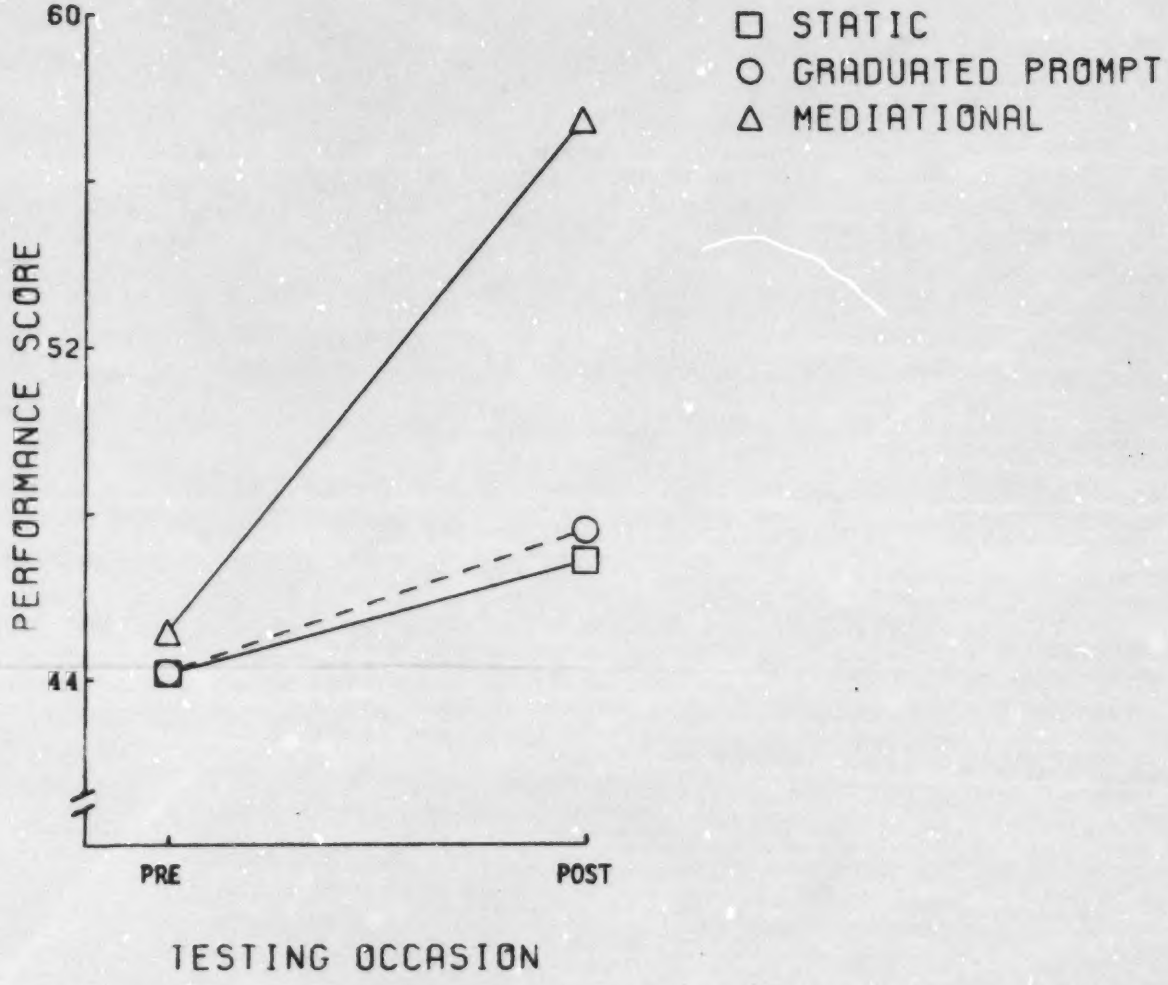

Figure 1. Assessment Group (Static/Graduated Prompt/Mediational) by Trial (Before Training/After Training) Interactions for Transfer Performance Score

When these data were analyzed for learners only, the results were similiar to those of the entire group, i.e., the mediation group scored significantly higher on the post transfer task than did the graduated prompt group. The 2 x 2 analysis of variance (Treatment Group by Trial) results showed a significant main effect for trial ($F=17.68$, $df=1/28$, $p < .01$) and a Group by Trail interaction ($F=4.53$, $df=1/28$, $p < .05$). Because the criterion for learner was more stringent in the studies of Bryant, Brown, & Campion (1983); Ferrara, Brown, & Campione (1981) and Hall & Day (1982), a post hoc analysis was performed using the learning criterion in those studies (3 consecutive correct responses on which no prompts were needed). In this 2 X 2 analysis of variance, Group (learners with new criterion or nonlearners) by Trial (pre- or posttest), there were no significant findings when the dependent variable was transfer test performance. Therefore, even using this more stringent criterion for learning the initial findings reported on transfer performance were upheld.

The children's observational data were infrequent and therefore all off task behavior categories were combined into one score for each child for each of the testing settings: (a) independent performance; (b) pretest; (c) transfer posttest. These data were analyzed with analysis of variance procedures but no significant effects were found. Since the total off-task behavior scores were also infrequent, several post hoc analyses were performed. One analysis was a chi-square analysis on the number of children in each assessment group who scored above the mean amount of off-task behavior on the <u>independent performance</u> task. This analysis produced no significant differences. Another chi-square analysis included the graduated prompt and mediational assessment groups off-task behavior during <u>pretest</u> and <u>transfer posttest</u>. This chi-square was significant ($X^2=3.89$, $df=1$, $p < .05$). As shown in Table 3 in the graduated prompt group: (a) 10 children had higher frequencies of off-task behavior at transfer posttest than they had at pretest; and (b) 5 children had lower frequencies of off-task behavior at transfer posttest. In

the mediational group: (a) 5 children had higher frequencies of off-task behavior at transfer posttest than they had at pretest; and (b) 11 children had lower frequencies of off-task behavior at transfer posttest than they had at pretest.

TABLE 3

NUMBER OF CHILDREN WHO HAD MORE OR FEWER INCIDENTS OF OFF-TASK BEHAVIOR

	Graduated Prompt	Mediation
Number of children who had higher frequencies of off-task behavior at posttest than they had at pretest	10	5
Number of children who had lower frequencies of off-task behavior at posttest than they had at pretest	5	11

Correlations were computed between all children's scores on independent performance and transfer posttest performance scores and the time that the children spent in training. Neither correlation was significant (independent performance with time $r = -.05$ and transfer posttest performance with time $r = -.15$).

Discussion

Hypothesis 1, that mediational and graduated prompt dynamic assessment procedures reveal learning ability that is not apparent in static assessment, was supported by the data. This result is consistent with those of research with older children (Bryant et al., 1983; Budoff & Corman, 1973; 1975; Delclos, 1983; Ferrara, 1983; Feuerstein et al, 1979; 1982; Hall & Day, in press; Haywood & Maisto, 1983; Keane, 1983). In light of the Bryant, Brown, & Campione (1983) results, it might be expected that dynamic assessment will add accurary to IQ in predicting children's later performance in intellectual tests. A few case examples from our data may clarify this point. Two examples are children who received graduated prompt dynamic assessment and two are examples of children who received mediational dynamic assessment. Child A & Child B both received graduated prompt dynamic assessment. Child A had a GCI that was within the range of 62.2 to 77.8 (95% confidence) and had an MA of 45 months. Child B had a GCI that was within the range of 68.6 to 85.4 (95% confidence and had a MA of 53 months). Even though child A's GCI range overlapped with the mentally retarded range, this child was a learner and transferer on the graduated prompt dynamic assessment, thus showing more potential than was apparent on the static assessment. In contrast to child A, child B's GCI was above the mentally retarded range but this child, although a learner, was not a transferer. Child B may have more difficulty with later school learning than will child A.

This same type of effect was evident with children in mediational dynamic assessment, for example, Child C and Child D. Child C's GCI range was 55.2 to 70.8 (95% confidence), with MA of 39 months, but during dynamic assessment this child was both a learner and a transferer. Child D's GCI range was 60.6 to 79.4 (95% confidence), and had a MA of 37 months, but this child was a learner but not a transferer. Therefore, dynamic assessment may add to static assessment measures in providing more accurate assessments for young children.

Hypothesis 2, that analyses of children's independent performance and transfer task performance reveal a direct relationship to the type of training provided in assessment, was supported by the data. On independent performance and on transfer test performance, the mediation assessment group scored higher than the static assessment or graduated prompt assessment groups. On independent performance but not on transfer test performance, the graduated prompt assessment group scored higher than the static assessment group. These results support the claim that generalizable cognitive change is taking place in mediational assessment (Feuerstein et al, 1979). These results add further support to hypothesis 1, that is, that the dynamic assessment procedures reveal learning potential not apparent in static assessment.

Hypothesis 3, that analyses of children's off-task behavior during independent performance and transfer performance revealed a direct relationship to the type of training provided in assessment, was not supported conclusively by the data. There was an indication in the post hoc analyses that type of dynamic assessment had an effect on children's off task behavior. Ten children who received graduauted prompt assessment exhibited a greater frequency of off-task behavior during transfer posttest than they exhibited at pretest. Only five children in the mediational assessment exhibited a greater amount of off-task behavior at posttest than at pretest. This type of observational data will need to be collected on extended periods of pretest and posttest behavior in order that the frequency of behavior will be high enough to yield generalizable inferences.

Hypothesis 4, that the results of the type of assessment that children receive are not systematically associated with the amount of time that children are exposed to training, was not rejected by the results. It does not seem that the progress that children made at posttest was related to the amount of time that they spent in training.

To summarize, both dynamic assessments (graduated prompt and mediational) show children having learning potential that is not evident in static assessment. Mediational dynamic assessment produces a significant degree of generalizable change when compared to both static and graduated prompt dynamic assessment methods. These research findings are not systematically associated with the amount of time that children spent in training.

Both methods of dynamic assessment show potential not tapped by standard static assessment methods. The mediation method of dynamic assessment may be used to give educational diagnostic information on cognitive functions and on how structural change takes place when mediation is provided. In contrast, the graduated prompt method might be better to use for purposes of identifying children who, despite low scores on standard tests, may have the potential to learn in regular classes where the richness of mediated teaching is less than is involved in mediational dynamic assessment. One model that our reseach team is proposing is that all three assessment procedures studied in this research be used with young children who teachers and professionals suspect may need special educational services. In the first stage of this continuum of assessment services model, children would receive standard static assessment. Those children whose IQ's are significantly below the average would then receive graduated prompt dynamic assessment. All of the children who scored within the average IQ range would not receive further assessment nor special education services. Those children whose performance on graduated prompt assessment showed fast learning and high transfer would be considered to have done poorly on the static test for other reasons than cognitive delay and they would not receive special educational services (although they might need some short term resource room help). Children who were either slow learners or low transferers would receive mediational dynamic assessment. Children who were fast learners and high transfers with mediational assessment would receive special educational services with the goal that they would develop effective

cognitive functions quickly and generalize effectively therefore their being mainstreamed into regular school programs in a brief period of time (these children may need resource room help when they are mainstreamed into regular classes). Children who were slow learners or low transferers in mediational assessment will need more intensive and longer term special educational services inorder to develop effective cognitive functions. The data from this present research study support this type of model but this study alone does not validate the model conclusively. Major research on this model is needed before it is validated.

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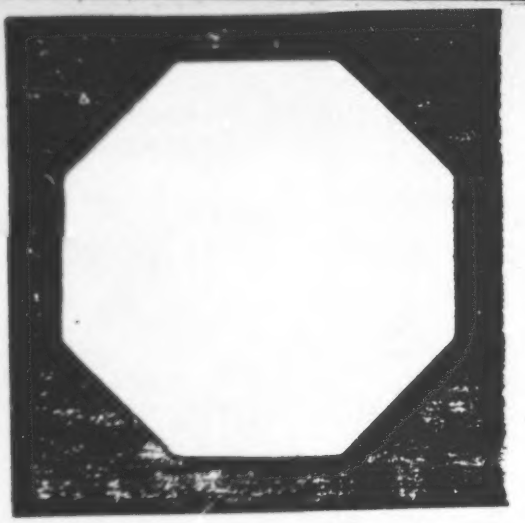
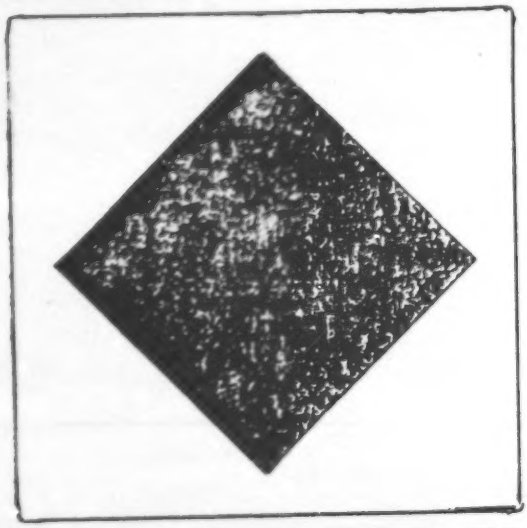
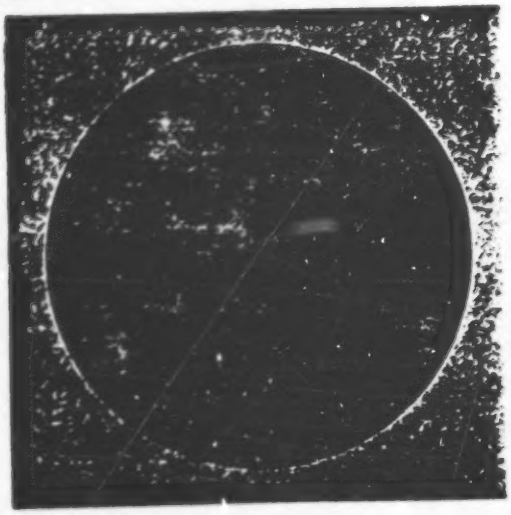
APPENDIX A

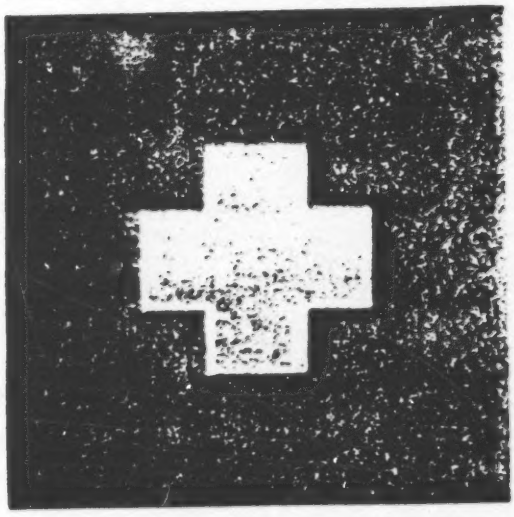
Stencil Items



Sample Item

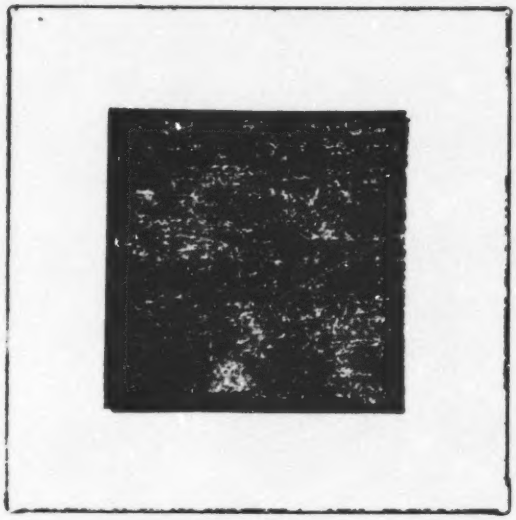


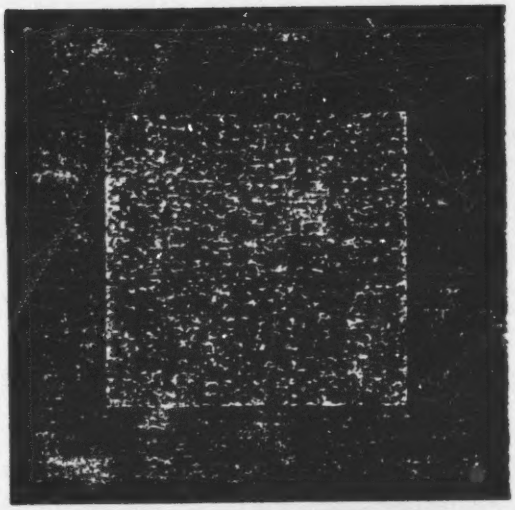


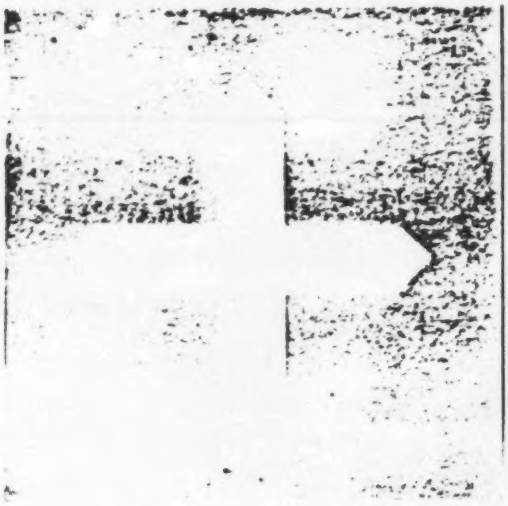


Training Items

Stencil Design Test







Near Transfer Items

APPENDIX B

Directions for Animal House

Place the board in front of the child and place the 28 colored cylinders at the upper right or left of the board, depending on whether the child is right or left handed. Say slowly LOOK HERE ON TOP (point to the key at the top of the board). HERE IS A DOG AND IT LIVES IN A BLACK HOUSE (point to the cylinder underneath the dog). HERE IS A CHICKEN AND IT LIVES IN A WHITE HOUSE (point as before). HERE IS A FISH AND IT LIVES IN A BLUE HOUSE (point). HERE IS A CAT AND IT LIVES IN A YELLOW HOUSE. Next, point to the figure in Row 1, and say, I'M GOING TO DO A COUPLE OF THESE NOW. YOU SEE, HERE IS A CHICKEN. IT HAS NO HOUSE UNDER IT, SO LET'S FIND THE RIGHT - COLOR HOUSE. THE CHICKEN LIVES IN A WHITE HOUSE. (point to the key at the top of the board) SO I'M GOING TO FIND A WHITE HOUSE AND PUT IT IN THIS HOLE (insert a white cylinder under the figure). NOW LOOK AT THE FISH (point to the second figure). IT LIVES IN A BLUE HOUSE (again point to the key) SO I'M GOING TO PUT A BLUE ONE HERE (put it in). HERE IS A CAT. WHAT COLOR HOUSE SHOULD GO HERE? (point to the hole). If the child designates a yellow cylinder, say, THAT'S RIGHT, PUT IT HERE. If he makes a wrong choice, say, IT SHOULD BE A YELLOW ONE. Wait while the child inserts the peg. HERE IS A DOG. YOU FIND THE HOUSE THAT SHOULD GO HERE. IF YOU ARE NOT SURE LOOK UP AT THE TOP (point to the key) AND IT WILL SHOW YOU WHAT COLOR IT SHOULD BE. If the child chooses a black cylinder, say, THAT'S RIGHT, SO PUT IT HERE. If he makes a wrong choice, correct him as before and wait while he places the correct cylinder.

NOW HERE IS THE CAT AGAIN. WHICH HOUSE SHOULD GO HERE? If the child chooses a yellow cylinder, say, THAT'S RIGHT, but if he fails, discontinue the activity. After the first 5 figures have been completed, quickly remove the cylinders from the board and place them in the tray. Say, NOW I WANT YOU TO PUT THE RIGHT HOUSE UNDER EACH ANIMAL, ALL BY YOURSELF. Begin here (point) DO ONE RIGHT AFTER THE OTHER, AND WHEN YOU FINISH THIS ROW, GO ON TO THE NEXT ROW. (point). LET'S SEE

HOW FAST YOU CAN DO IT. READY? BEGIN.

If the child hesitates after the first row, tell him to go on to the next row.

APPENDIX C

Tester Criteria Forms

Experimenter instructing	The child exhibits behavior to which the tester responds by repeating an instruction, e.g., "Make yours right here" or by structuring the task, e.g., "What do you need to go in here?" or "You have to look at all these cards to make one look just like mine." If the topic changes, count the second topic as another incident of experimenter instructs.
Experimenter instructing self-regulation	The tester tells the child that s/he needs to stop and think, calm down, etc., e.g., "Wait a minute," "Watch." This includes nonverbal regulation such as the tester taking the child's hand and pointing it to where the child needs to look.
Child beginning task when asked	When the tester tells the child to "Make one that looks just like this" or to begin working the child begins working the first time asked.
Child speaking out during instructions	The child speaks, gestures, or starts the task before the instructions are finished.
Child spontaneously giving correct information	Child explains what s/he is going to do before performing the task and/or explains intermediate steps--e.g. "I have to look up in this corner." This can be a one word utterance, such as the child looks at the cat, say yellow, and then puts the yellow peg in. This information is specific in nature.
Child spontaneously evaluating self	The child gives an evaluation of his or her performance, e.g., "I did it.", "I made that," "I made this."
Child asking for help	The child asks vague help questions such as "How do you do this?" or the child says that s/he cannot do the task.
Child overdependence on seeking confirmation	The child asks or looks for approval or evaluation of what s/he has just done from the tester, i.e., "Is this right?"
Child characterized as using trial and error learning	The child gives an answer and, without any intervention from the experimenter, the child changes the answer.
Child inappropriately manipulating stencils	The number of stencils that the child touches that are not a part of the model design that is presently being made. This does not include straightening the stencils or putting them back in their places.

Child putting stencil over model	The child puts a stencil over the model and lets go of it.
Child disrupting	Active contact, using hands, on the environment or body that is not part of the material in the study. This includes manipulating task materials when the child should be listening to instructions. Disruptive behavior such as hitting, throwing objects, screaming, crying, talking about non-task topics and looking away from the experimenter are also included here. Don't include incidents that can be coded in other categories such as "Speaks out during instructions" or "Inappropriate manipulation."
Child pausing before starting	The number of seconds that elapse from the last word of instructions given to begin the task and the first time the child touches a stencil, or peg.

APPENDIX D

Observation Categories and Definitions

Prompt Tester Criteria
Child No._____ Card No._____

	1		2		3		4		5		6		7		8		9	
	N	U	N	U	N	U	N	U	N	U	N	U	N	U	N	U	N	U
1. Requests explain.	X																	
2. Explains	X				X		X				X							
3. Points to cards	X		X		X		X						X		X			
4. Requests a specific comparison					X													
5. Indicates components of model					X													
6. Requests number of colors on card using model							X											
7. Illustrates stencil placement to make model											X							
8. Asks to identify components on model									X				X					
9. Asks to find matching components with - minimal assistance													X					
- maximal assistance															X			
10. Asks child to place component in position																	X	
11. Asks child to compare construction to model	X		X		X		X		X		X		X		X			
12. Gives correct feedback																		

N = Needed
U = Used

No. needed _____
No. used _____
Percent accuracy _____

Mediation Tester Criteria
Child No._____

	N	U
point cut-outs	X	
I cut them out	X	
label shapes a	X	
b	X	
c	X	
d	X	
e	X	
f	X	
g	X	
h	X	
i	X	
j	X	
k	X	
l	X	
match a shape	X	
solids point	X	
note on bottom row	X	
label colors a	X	
b	X	
c	X	
d	X	
e	X	
f	X	
count solids	X	
repeat if can't count		
compare two circles (big/small)	X	
two white squares	X	
two blue cards	X	
two yellow cards	X	
put cards in wrong place	X	
go back if don't see cards in wrong place		
demo. green circle-yellow solid	X	
change solids - at least twice	X	
go back if can't change solids		
change cut-outs - outside changes	X	
put solid on top	X	
est. rule cut-out on top in order to see solid in middle	X	
end with sample	X	
into. sample model	X	
tell how model made	X	
teach search pattern	X	
ask child to make one like model	X	
check model go over correct		
go over incorrect		

N = needed
U = used

No. needed ___
No. used ___
Percent accuracy ___

Learning Potential Assessment for Preschool Children

Final Report

Grant # G008201038

Project # 023BH20025

ABSTRACT

Two methods of dynamic assessment, "graduated prompt" and "mediation," were compared to each other and to static assessment. Measures included children's: (a) classification as learner or nonlearner; (b) achievement on independent performance; (c) achievement on pretest and transfer posttest; (d) observed off-task behavior; and (e) amount of time in training. These dynamic assessment methods were studied because they have the potential of being more accurate than static assessment in (a) identifying children with intellectual deficits and (b) ascertaining diagnostic information that can be used in determining the kind of educational help that children need. Children receiving dynamic assessment showed learning potential not exhibited on static assessment. Children receiving dynamic assessment procedures were better able to perform a cognitive task independently than were children receiving static assessment. Children receiving mediation dynamic assessment performed a transfer task better than the graduated prompt and static assessment groups. The amount of time that children spent in training did not account for these results.